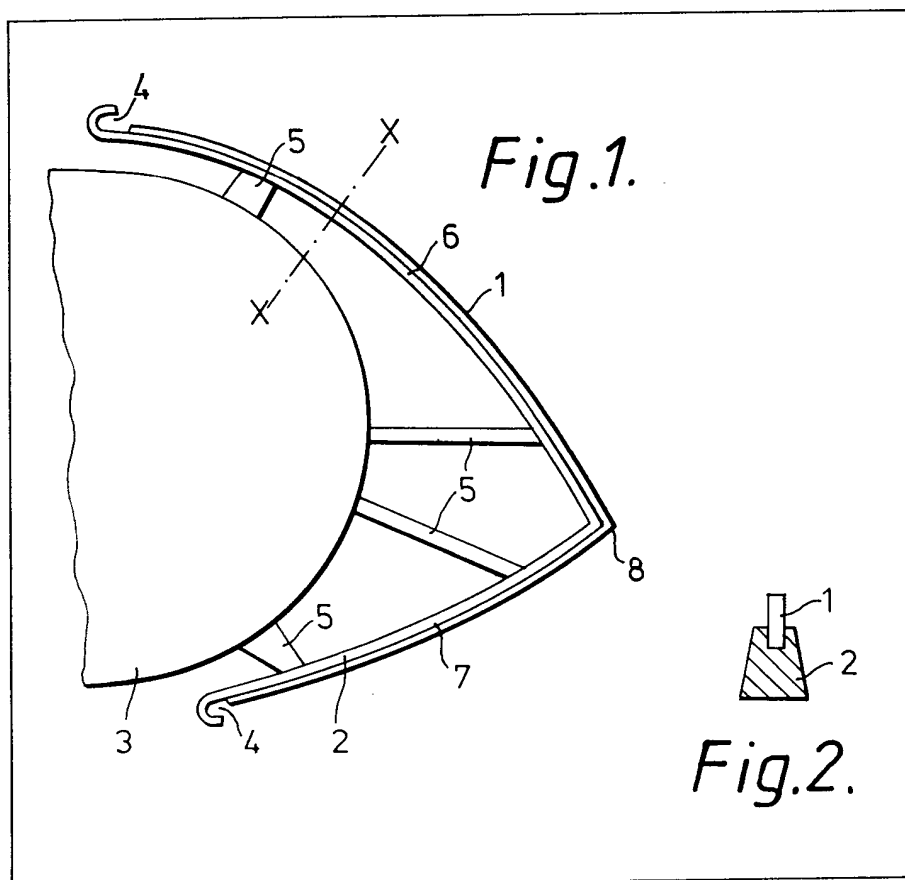
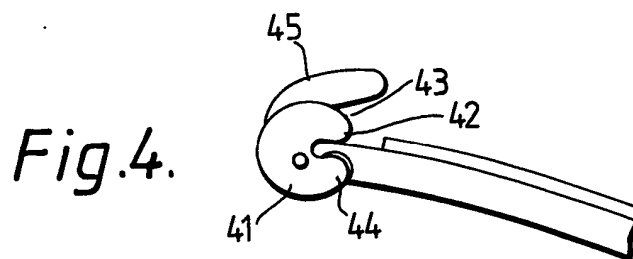
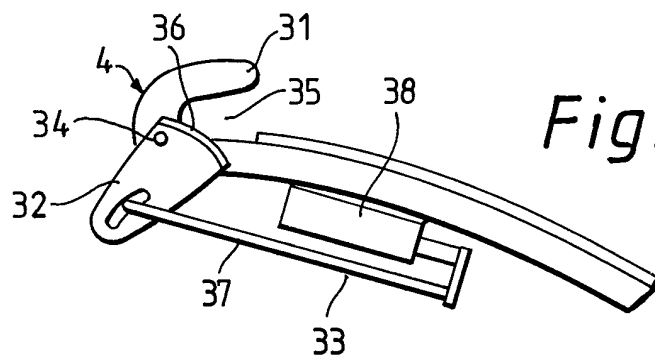
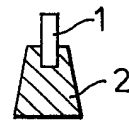
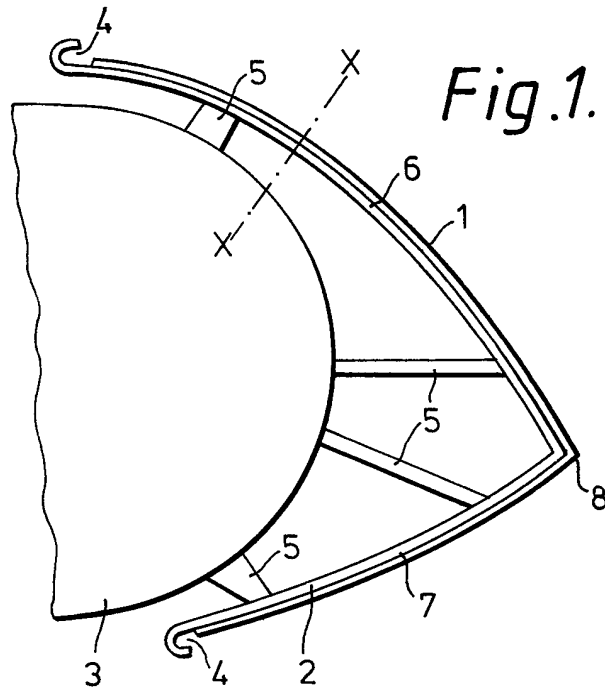


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(54) **Cable cutting device**

(57) A cable cutting device on an aircraft, especially a helicopter, and comprising a blade 1 mounted cutting edge forward and inclined rearwardly from the forwardmost point of the fuselage, preferably both thereabove and therebelow, and preferably terminating in assisted, eg. explosively assisted, cable cutting means. De-icing heater for the blade may be provided.





SPECIFICATION

Improvements relating to aircraft safety

5 The present invention relates to aircraft safety and in particular to the problem of helicopter wire strikes.

The danger of wire strikes is an ever-present hazard in the operation of helicopters and a large number of helicopter fatalities have arisen in recent
 10 years from wire strikes. Previously, the hazard existed during the second World War in respect of fixed wing aircraft encountering cables suspended from barrage balloons. Attempts were made to overcome this hazard and the wings of the aircraft
 15 were fitted with an armoured leading edge which directed the cable into a scissor slot for severance. The system is said to have worked when the cable reached the scissor slot but if this did not happen the cable would often sever the main spar of the aircraft
 20 wing bringing the aircraft down.

It is an object of the present invention to provide an aircraft, particularly a helicopter, with a means of severing horizontally displaced cables to reduce the wire strike hazard.

25 According to the present invention an aircraft has a cable severing device comprising an elongated blade included in a blade support member which is forwardly mounted on the aircraft fuselage, the elongated blade being disposed in a vertical plane
 30 and inclined rearwardly from a forward point intermediate the upper and lower levels of the aircraft fuselage, such that when the aircraft collides with a horizontal cable the cable traverses the blade for severance. Preferably the elongated blade extends
 35 both above and below the forward point.

According to a feature of the present invention the elongated blade has a saw toothed cutting edge.

Advantageously the elongated blade includes at each rearward end, a guillotine assembly such that a
 40 cable which is not severed by the elongated blade is severed upon reaching the guillotine.

The guillotine assembly may comprise a guillotine, a guillotine operating member, a cable securing member associated with the blade support member,
 45 the securing member returning upon itself to form a recess, the guillotine being pivotally positioned on the securing member such that upon activation of the operating member the cutting edge of the guillotine moves between the sides of the recess and
 50 at the same time towards the closed end of the recess. Preferably the cutting edge of the guillotine is arcuate in form.

The operating member may include an impulse member activated from an explosive charge which is
 55 detonated when a cable has entered the recess, such that the guillotine is driven across the recess in a minimal time.

A cable cutting device in accordance with the present invention will now be described by way of
 60 example with reference to the following Figures of which:

Figure 1 shows an elevation of the cutting device mounted on a helicopter fuselage,

Figure 2 shows a cross-section of the cutting
 65 device along the line X-X,

Figure 3 is an enlarged view of a guillotine assembly at the upper end of the cutting device, and
Figure 4 shows a self-operating guillotine assembly.

70 Referring to *Figure 1* and *Figure 2* the cutting device includes an elongated blade 1 and a blade support member 2. The blade support member 2 is rigidly attached at the front of a helicopter 3 and extends over the height of the helicopter fuselage.
 75 The support member 2 has a guillotine assembly 4 mounted at each of its ends.

The support member 2 is secured to the helicopter by pylons 5 and has upper and lower arms 6 and 7 respectively which extend from an apex point 8. The
 80 lower arm 7 is shorter than upper arm 6 and both arms are arcuated in form. The support member 2 is a laminated structure of carbon fibre material.

The blade 1 is held in the support member 2 and extends on either side of the apex point 8 between
 85 the guillotine assemblies 4. The blade has a saw toothed cutting edge and is manufactured from tungsten steel.

As shown in *Figure 3* the guillotine assembly 4 includes a cable securing member 31 having a
 90 tungsten steel guillotine 32 one end of which is attached to an operating member 33.

The securing member 31 is in the form of a clevis joint and the blade 32 is pivotable therein. The
 95 securing member 31 curves back upon itself to form a 'U' shaped recess 35 in which a cable may be retained for severing.

The guillotine 32 is mounted upon a pivot pin 34 and has a curved cutting edge 36 which is eccentrically disposed with respect to the pivot pin. The
 100 guillotine 32 is also pivotably linked to the operating member 33.

The operating member comprises a guillotine connecting rod 37 which is associated with an
 explosive chamber 38. The chamber is electrically
 105 linked with a sensing device (not shown) which serves to detonate the explosive charge in the chamber 38 when a cable is located in the recess of the securing member 31. Detonation causes the connecting rod 37 to retract causing the guillotine 32
 110 to rotate so that the cutting edge 36 moves both across and up the recess to sever the cable.

If during operation the helicopter 3 collides with a series of horizontal cables, each cable on contact
 115 with the elongated blade 1 will be deflected either up or down the blade according to whether contact is made above or below the apex point 8. As the cable traverses the blade it will be sawn through and severed. However, if the cable is not completely
 120 sawn through after traversing the blade 1 then on location in the recess 35 it is severed completely upon detonation of the explosive chamber 38. As a result the helicopter can continue along its original flight path without accident.

In an alternative form the guillotine assembly may
 125 include a self-activating guillotine 41 as shown in *Figure 4*. The guillotine 41 is a horse-shoe shaped plate having one free end 42 biased to overlap the recess 43 and the other end 44 formed with an arcuate cutting edge. The guillotine is pivoted on the
 130 support member 45 such that in use a cable entering

the recess displaces the free end 42 and in doing so causes the end 44 to traverse the recess 43 to cut the cable. In this type of device the force exerted by the cable is used in turn to cut the cable.

- 5 The invention may be realised in many different forms, for example two or more guillotine assemblies may be mounted at the ends of the support member to cope with more than one unsevered cable. Also the support member may include a
10 heating element to prevent ice accretion in icing conditions.

CLAIMS

- 15 1. An aircraft having a cable severing device comprising an elongated blade included in a blade support member which is forwardly mounted on the aircraft fuselage, the elongated blade being dis-
posed in a vertical plane and inclined rearwardly
20 from a forward point intermediate the upper and lower levels of the aircraft fuselage, such that when the aircraft collides with a horizontal cable the cable traverses the blade for severance.
2. A device as claimed in claim 1 and wherein the
25 elongated blade extends both above and below the forward point.
3. A device as claimed in claim 1 or claim 2 and wherein the elongated blade has a saw toothed cutting edge.
- 30 4. A device as claimed in any one of claims 1 to 3 and wherein the elongated blade includes at the or each rearward end a guillotine assembly.

5. A device as claimed in claim 4 and wherein the guillotine assembly comprises a guillotine, a guillo-
tine operating member, a cable securing member
35 associated with the blade support member, the securing member returning upon itself to form a recess, the guillotine being pivotally positioned on the securing member such that upon activation of
40 the operating member the cutting edge of the guillotine moves between the sides of the recess and at the same time towards the closed end of the recess.

6. A device as claimed in claim 5 and wherein the
45 cutting edge of the guillotine is arcuate in form.

7. A device as claimed in any one of the preceding claims and including explodable means.

8. A device as claimed in claim 5 or claim 6 and
50 wherein the operating member includes an impulse member activated from an explosive charge arranged to be detonated when a cable has entered the recess.

9. A device as claimed in any one of the preceding claims and having means for preventing ice
55 accretion.

10. A device as claimed in claim 1 and wherein the ice accretion prevention means comprises a heater.

11. A device as claimed in any one of the
60 preceding claims and wherein the aircraft is a helicopter.

12. A device substantially as hereinbefore described with reference to the accompanying drawings.